Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) Solid state substrate adapted and configured for DNA immobilization, said solid state substrate having a thermal conductivity ratio of at least 0.1W/cmEK suitable for amplifying and immobilizing DNA, wherein the surface of the substrate is modified by a polar radical formed at the surface of the substrate by binding a chloride by irradiating the surface of the substrate with ultraviolet light in an atmosphere of chlorine gas to bind chloride to the substrate, and replacing the chloride by binding a carboxyl radical to the substrate by setting the substrate into a solution containing a ~~carboxyl radical with a hydroxyl group having from 1 to 10 carbon atoms~~sodium sebacate, wherein the sebacyl radical is introduced to the substrate using a titanium or an aluminum coupling agent.

2. (Previously Presented) A substrate as claimed in claim 1, wherein said substrate is synthetic diamond or diamond-like carbon.

Claims 3 - 6 (Cancelled)

7. (Previously Presented) The substrate as claimed in claim 1, wherein said polar radical is a ~~carboxyl~~ sebacyl radical and said sebacyl~~carboxyl~~ radical is connected on a surface of said substrate through amide linkage.

Claims 8-11 (Cancelled)

12. (Withdrawn) A method for amplifying DNA for a substrate or chip, comprising the following steps:

(a) chemically modifying the substrate or chip to provide a polar radical selected from the group consisting of hydroxyl radical, carboxyl radical, epoxy radical, amino radical, sulfuric radical, cyano radical, nitro radical, and thio radical on the surface of the substrate or chip;

(b) cleaning the chemically modified substrate or chip with Tris-EDTA buffer solution;

(c) dipping the chemically modified and cleaned substrate or chip into a solution containing a primer of amplifying target DNA, four kinds of nucleotides and DNA polymerase;

(d) holding the temperature of said solution at 95°C for about 1.5 minutes;

(e) holding the temperature of said solution at 45°C for about a minute;

(f) holding the temperature of said solution at 74°C for about 2 minutes; and

(g) repeating steps (d)-(f).

13. (Currently Amended) A solid state substrate having DNA immobilized thereon, wherein said substrate is diamond or diamond like carbon and said substrate is chemically modified by binding a chloride by irradiating the substrate with ultraviolet light in a chlorine gas atmosphere, and then replacing the chloride with a hydroxyl radial by setting the substrate into a boiling alkali solution or steam, or an amino radical by irradiating the substrate with ultraviolet light in an atmosphere ammonia gas, or a sebacyl radical~~carboxyl radical with a hydroxyl group having from 1 to 10 carbon atoms or an epoxy radical with a hydrocarbon having from 1 to 10 carbon atoms~~ by setting the substrate into a solution containing ~~a carboxyl radical or an epoxy radical~~sodium sebacate and coupling the sebacyl with a titanium or aluminum coupling agent.

14. (Currently Amended) The substrate having DNA immobilized thereon as claimed in claim 13, wherein said substrate has a ~~polar~~ sebacyl radical at a terminal through a hydrocarbon having from 1 to 10 carbon atoms on the surface of the substrate.

Claim 15 (Cancelled)

16. (Currently Amended) A chip for amplifying and immobilizing DNA wherein the surface of the chip is modified by binding a chloride by irradiating the chip with ultraviolet light in an atmosphere of chlorine gas, and replacing the chloride by a hydroxyl radical by setting the chip into a boiling alkali solution or steam, or an amino-radical by irradiating the chip with ultraviolet light in an atmosphere of ammonia gas, or a sebacyl~~carboxyl radical with a hydroxyl group having from 1 to 10 carbon atoms or an epoxy radical with a hydrocarbon having from 1 to 10 carbon atoms~~ by setting the chip into a solution containing ~~a carboxyl radical or an epoxy radical~~sodium sebacate and coupling the sebacyl radical with an aluminum or titanium coupling agent.

Claims 17 - 21 (Cancelled)

22. (Currently Amended) The substrate having DNA immobilized thereon as claimed in claim 15, wherein said sebacyl~~polar radical is a carboxyl radical and said carboxyl~~ radical is connected on a surface of said substrate through an ester linkage.

23. (Currently Amended) The substrate having DNA immobilized thereon as claimed in claim 15, wherein said sebacyl~~polar radical is a carboxyl radical and said carboxyl~~

radical is connected on a surface of said substrate through an amide linkage.

24. (Currently Amended) The substrate having DNA immobilized thereon as claimed in claim 15, wherein said sebacyl~~polar radical is a carboxyl radical and said carboxyl~~ radical is connected to a surface of said substrate with a silane coupling agent, a titanium coupling agent or an aluminum coupling agent.

Claim 25 (Cancelled)

26. (Withdrawn) A method for immobilizing and amplifying DNA on the surface of a substrate or chip comprising the following steps:

a. chemically modifying the substrate or chip by binding a chloride radical to the surface of the substrate or chip;

b. chemically modifying the substrate or chip having a chloride radical at its terminal by replacing the chloride radical with a hydroxyl radical on the surface of the substrate or chip;

c. chemically modifying the substrate or chip having a hydroxyl radical at its terminal by binding a hydrocarbon having a carboxyl radical to the hydroxyl radical on the surface of the substrate or chip; and

d. immobilizing and amplifying DNA on the surface of the substrate or chip having a carboxyl radical at its terminal.

27. (Withdrawn) A method for immobilizing and amplifying DNA onto the surface of a substrate or chip comprising the following steps:

a. chemically modifying the substrate or chip by binding a chloride radical to the surface of the substrate or chip;

b. chemically modifying the substrate or chip having a chloride radical at its terminal by replacing the chloride radical with an amino radical on the surface of the substrate or chip;

c. chemically modifying the substrate or chip having an amino radical at its terminal by binding a hydrocarbon having a carboxyl radical to the amino radical on the surface of the substrate or chip; and

d. immobilizing and amplifying DNA on the surface of the substrate or chip having a carboxyl radical at its terminal.

28. (Withdrawn) A method for immobilizing and amplifying DNA onto the surface of a substrate or chip comprising the following steps:

a. oxidizing the surface of the substrate of chip with oxygen plasma;

b. chemically modifying the substrate or chip by binding a chloride radical to the surface of the substrate or chip;

c. chemically modifying the substrate or chip having a chloride radical at its terminal by replacing the chloride radical with an amino radical on the surface of the substrate or chip;

d. chemically modifying the substrate or chip having an amino radical at its terminal by binding a hydrocarbon having a carboxyl radical to the amino radical on the surface of the substrate or chip; and

e. immobilizing and amplifying DNA on the surface of the substrate or chip having a carboxyl radical at its terminal.

29. (Withdrawn) A method for immobilizing and amplifying DNA onto the surface of a substrate or chip comprising the following steps:

a. oxidizing the surface of the substrate or chip with oxygen plasma;

b. chemically modifying the substrate or chip by binding a chloride radical to the surface of the substrate or chip;

c. chemically modifying the substrate or chip having a chloride radical at its terminal by replacing the chloride radical with a hydroxyl radical on the surface of the substrate or chip;

d. chemically modifying the substrate or chip having a hydroxyl radical at its terminal by binding a hydrocarbon having a carboxyl radical to the hydroxyl radical on the surface of the substrate or chip; and

e. immobilizing and amplifying DNA on the surface of the substrate or chip having a carboxyl radical at its terminal.

30. (Withdrawn) A method for immobilizing and amplifying DNA onto the surface of a substrate or chip comprising the following steps:

a. chemically modifying the substrate or chip by binding a chloride radical to the surface of the substrate or chip;

b. chemically modifying the substrate or chip having a chloride radical at its terminal by replacing the chloride radical with a hydrocarbon having a carboxyl radical on the surface of the substrate or chip; and

c. immobilizing and amplifying DNA on the surface of the substrate or chip having a carboxyl radical at its terminal.

31. (Withdrawn) The method for immobilizing and amplifying DNA on the surface of a substrate or chip as claimed in claim 26 wherein said hydrocarbon has one or more carboxyl.

32. (Withdrawn) The method for immobilizing and amplifying DNA on the surface of a substrate or chip as claimed in claim 27 wherein the hydrocarbon has one or more carboxyl radicals.

33. (Withdrawn) The method for immobilizing and amplifying DNA on the surface of a substrate or chip as claimed in claim 28 wherein the hydrocarbon has one or more carboxyl radicals.

34. (Withdrawn) The method for immobilizing and amplifying DNA on the surface or a substrate or chip as

claimed in claim 29 wherein the hydrocarbon has one or more carboxyl radicals.

35. (Withdrawn) The method for immobilizing and amplifying DNA on the surface of a substrate or chip as claimed in claim 30 wherein the hydrocarbon has one or more carboxyl radicals.

36. (Withdrawn) A method for immobilizing and amplifying DNA on the surface of a substrate or chip comprising the following steps:

a. chemically modifying the substrate or chip by binding chloride radical onto the surface of the substrate or chip;

b. chemically modifying the substrate or chip having chloride radical at its terminal by replacing the chloride radical with a hydroxyl radical on the surface of the substrate or chip;

c. chemically modifying the substrate or chip having a hydroxyl radical at its terminal by binding a silane coupling agent having an epoxy radical or an amino radical to the hydroxyl radical on the surface of the substrate or chip;

d. chemically modifying the substrate or chip having an epoxy radical or an amino radical at its terminal by

binding a hydrocarbon having a carboxyl radical to the hydroxyl radical on the surface of the substrate or chip; and

e. immobilizing and amplifying DNA on the surface of the substrate or chip having an epoxy radical or an amino radical at its terminal.

37. (Withdrawn) A method for immobilizing and amplifying DNA on the surface of a substrate or chip comprising the following steps:

a. chemically modifying the substrate or chip by binding hydroxyl radical onto the surface of the substrate or chip;

b. chemically modifying the substrate or chip having a hydroxyl radical at its terminal by binding a silane coupling agent having an epoxy radical or an amino radical to the hydroxyl radical on the surface of the substrate or chip;

c. chemically modifying the substrate or chip having an epoxy radical or an amino radical at its terminal by binding a hydrocarbon having a carboxyl radical to the hydroxyl radical on the surface of the substrate or chip; and

d. immobilizing and amplifying DNA on the surface of the substrate or chip having an epoxy radical or an amino radical at its terminal.

38. (Withdrawn) A method for amplifying DNA comprising immobilizing DNA on a substrate having thermal conductivity ratio of at least 0.1W/cmEK, wherein said substrate is chemically modified and has a polar radical selected from the group consisting of hydroxyl, carboxyl, epoxy, and amino at a terminal thereof, said method comprising:

a. adding to said substrate on which DNA has been immobilized a primer with respect to the target DNA and a PCR reaction solution including four kinds of nucleotides and DNA polymerase;

b. increasing the temperature of the substrate to 95EC for about 1.5 minute to convert the double chain DNA to a single chain;

c. cooling the temperature of the substrate to 45EC for about one minute to connect the single chain DNA to the DNA primer;

d. increasing the temperature of the substrate to 74ECV for about two minutes to extend the DNA chain by heat resistant DNA polymerase; and

e. repeating the cycle.

39. (Previously Presented) The solid state substrate according to claim 1 wherein the surface of the substrate is roughened.

40. (Previously Presented) The solid state substrate according to claim 13 wherein the surface of the substrate is roughened.

41. (Previously Presented) The chip according to claim 16 wherein the surface of the chip is roughened.

42. (Currently Amended) A substrate having DNA immobilized thereon, said substrate having a surface modified to contain a sebacyl~~polar radical containing a hydrocarbon chain and a polar~~ group ~~selected from the group consisting of carboxyl, epoxy, and amino~~, wherein said sebacyl~~polar~~ radical is connected to the surface through a titanium coupling agent or an aluminum coupling agent.